REMARKS

Favorable reconsideration of this application, in light of the following discussion and in view of the present amendment, is respectfully requested.

Claims 23-24 are added. Claims 1-24 are pending in the application.

I. Rejection under 35 U.S.C. § 102(e)

In the Office Action, at page 2, numbered paragraph 2, claims 1, 5-6, 11, 15-16, and 18-22 were rejected under 35 U.S.C. § 102(e) as being unpatentable over U.S. Patent No. 6,975,468 to Melrose et al. This rejection is respectfully traversed because Melrose does not discuss or suggest:

> calculating deviations between a reference head and each of the heads;
>
> switching a head in operation to a head associated with a track or sector requested to be accessed; and
>
> applying a deviation of the switched head, which is recorded in the mapping table, to the virtual track or the sector address of the track or the sector on which the switched head is positioned, to obtain the physical track or the sector address of the track on which the switched head is positioned;

as recited in independent claim 1, and similarly in independent claims 6 and 11.

As a non-limiting example, the present invention relates to a method of switching heads in a hard disk drive. A reference head is first designated, and the deviation between the reference head and the other heads is calculated and stored in the memory. Thereafter, a head is switched to a head associated with a track or sector requested to be accessed. The physical track address of the track on which the head is positioned is obtained by applying a deviation corresponding to the switched head to the virtual track address of the track on which the head is positioned. Thereafter, the track is accessed based on the physical track address.

Melrose discusses that "an individual off-track threshold value (Write Fault Limit) for each of the transducers are stored, which are used during write operations to determine when a corresponding transducer is too far off-track to reliably write data to the track." Further, "when performing a write operation, the disk drive controller first retrieves an off-track threshold value from the lookup table corresponding to the transducer associated with the write operation." Melrose then discusses that "the controller then allows data to be written to the target track only when the corresponding transducer is within a positional window about the target track that is defined by the retrieved off-track threshold value,...the disk drive controller monitors the position

of the transducer during the write operation to determine whether it is within the window, [and] if the transducer moves outside of the window, the controller suspends performance of the write operation until a future time" (col. 5, lines 6-32).

Melrose does not, however, discuss or suggest that deviations are calculated between a reference head and each of the other heads in the hard disk drive. Melrose instead uses threshold values for each of the transducers with reference to tracks to determine whether the transducer is too far off-track. In Melrose, "the off-track threshold values are specified as a function of radial position on the corresponding disk surface" (col. 5, lines 35-37). Melrose does not discuss or suggest that deviations are calculated between a reference head and each of the other heads. Further, Melrose makes no mention of switching a head in operation to another head associated with a track requested to be accessed. Melrose additionally does not discuss or suggest that a deviation of the switched head is applied to the virtual track address of the track on which the switched head is positioned to obtain the physical track address of the track on which the switched head is positioned and accessing that track using the obtained physical track address. Melrose only discusses that data is allowed to be written only to a target track when the transducer is within a positioned window about the target track that is defined by the off-track threshold value. Melrose does not discuss a deviation, nor does Melrose discuss applying the deviation *calculated between a reference head and the other heads* in the disk drive to a virtual track address to obtain the physical track address of the track where the head is positioned. Nowhere in Melrose is a deviation between a reference head and other heads applied in order to access a specific track on which the switched head is positioned.

Therefore, as Melrose does not discuss or suggest "calculating deviations between a reference head and each of the heads," "switching a head in operation to a head associated with a track or sector requested to be accessed," and "applying a deviation of the switched head, which is recorded in the mapping table, to the virtual track or the sector address of the track or the sector on which the switched head is positioned, to obtain the physical track or the sector address of the track on which the switched head is positioned," as recited in independent claim 1, and similarly in independent claims 6 and 11, claims 1, 6 and 11 patentably distinguish over the reference relied upon. Accordingly, withdrawal of the § 102(e) rejection is respectfully requested.

In regard to claim 15, Melrose does not discuss or suggest "calculating physical track addresses by referring to a mapping table stored in a memory; and accessing the disk using calculated physical track addresses," as recited in claim 15. Melrose does not involve

calculating physical track addresses by referring to a mapping table. Melrose merely discusses a lookup table used to store an individual off-track threshold value for each of the transducers, but does not discuss that a track address is calculated using a mapping table. In Melrose, the controller does not allow data to be written to a target track when a transducer is outputs of a positional window defined by the off-track threshold value, but Melrose does not discuss referring to a mapping table to calculated physical track addresses. Melrose merely discusses using the off-track threshold value to make a determination as to when to allow data to be written, but does not mention calculated a physical track address. Melrose further does not discuss or suggest that the disk is accessed using the physical track addresses calculated. In Melrose, data is written to a target track when the transducer is within the window defined by the off-track threshold value, but does not discuss that the disk is accessed using the specifically calculated physical track addresses. Therefore, as Melrose does not discuss or suggest "calculating physical track addresses by referring to a mapping table stored in a memory; and accessing the disk using calculated physical track addresses," as recited in independent claim 15, claims 15 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(e) rejection is respectfully requested.

As to claim 18, Melrose does not discuss or suggest that "the controller accesses a disk on the hard disk drive using physical track addresses read from disks on the hard disk drive and a mapping table stored in the memory," as recited in independent claim 18. Melrose merely provides a lookup table that stores off-track threshold values for each of the transducers, but does not discuss or suggest that a controller uses physical track addresses read from disks *and* a mapping table to access a disk. Melrose only determines when a transducer is too far off-track to reliably write data to the track, but does not discuss a mapping table (storing the deviations) and physical track addresses used together by the controller to access a disk on the hard disk drive. Therefore, as Melrose does not discuss or suggest accessing a disk using physical track addresses read from disks on the hard disk drive and a mapping table, as recited in claim 18, claim 18 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(e) rejection is respectfully requested.

Claims 5, 16 and 18-22 depend either directly or indirectly on independent claims 1, 15 and 18, respectively, and include all the features of their respective independent claims, plus additional features that are not discussed or suggested by the reference relied upon. For example, claim 5 recites "defining an available data zone, wherein the available data zone ranges from the first track from the outer boundary of a disk accessed by the reference head to the last track at the inner boundary of a disk accessed by a head having the greatest physical

address deviation." Therefore, as claims 5, 16 and 18-22 are dependent on independent claims 1, 15 and 18, these claims patentably distinguish over the reference relied upon for at least the reasons noted above. Accordingly, withdrawal of the § 102(e) rejection is respectfully requested.

II. Rejection under 35 U.S.C. § 103

In the Office Action, at page 4, numbered paragraph 4, claims 2, 7, 12-14 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Melrose in view of U.S. Patent No. 5,969,895 to Ueda et al. This rejection is respectfully traversed.

As discussed above, Melrose does not discuss or suggest all the features of independent claims 1, 6, 11 and 15. Specifically, Melrose does not discuss that deviations between a reference head and other heads in a hard disk drive are calculated and the deviations are used to obtain the physical track address of the track on which a switched head is positioned. Melrose further does not discuss or suggest that both the physical address of a track and a mapping table storing the deviations calculated are used to access a track on a disk. Applicants respectfully submit that Ueda fails to make up for the deficiency in Melrose.

Ueda discusses a method and apparatus for switching heads in a disk drive. Ueda includes an offset quantity table that stores offset quantity for each of the heads, the offset quantity being a value representative of the distance of a head with respect to a reference head. The values corresponding to the amount of off-track offset between heads are used to determine the head switching sequence. Particularly, in Ueda, the next head to switch to is the head having the smallest offset quantity. However, Ueda does not discuss or suggest that the head is switched, *then* a track is accessed based on a calculation done using both physical track addresses obtained and the deviations set into a mapping table. Ueda switches heads using the head switching sequences defined in the table, while the present invention switches heads then accesses the track above which the head is positioned using physical track addresses and a mapping table based on deviations calculated between a reference head and the switched head. Ueda does not make mention of the deviation between disks that may occur using the off-line STW method, which the present invention attempts to solve.

Further, the motivation cited by the Examiner to combine Melrose and Ueda "in order to efficiently switch heads in a disk drive" is not an adequate motivation to suggest the features of the present invention to one of ordinary skill in the art. It is unclear as to how the cited motivation would suggest to one of ordinary skill in the art to combine the determination of whether a recording operation can be performed in consideration of an offset, which is the distance from the center of a track to a head, of Melrose with the determination of the order of

the order of heads for sequential recording, which is based on an amount of offset between heads, of Ueda. The sequential recording of Ueda involves recording data in a cylinder, which is a set of identically numbered tracks of vertically disposed disks, while switching heads that correspond to the surfaces of the disks in a hard disk drive. The combination of Melrose and Ueda does not suggest that a deviation of the switched head is applied to a virtual track or sector address of the track or sector on which the switched head is positioned, to obtain the physical track or sector address of the track on which the switched head is positioned.

Therefore, the applicants respectfully submit that Melrose fails to discuss or suggest "calculating deviations between a reference head and each of the heads," "switching a head in operation to a head associated with a track or sector requested to be accessed," and "applying a deviation of the switched head, which is recorded in the mapping table, to the virtual track or the sector address of the track or the sector on which the switched head is positioned, to obtain the physical track or the sector address of the track on which the switched head is positioned," as recited in independent claim 1, and similarly in claims 6 and 11, and further fails to discuss or suggest "calculating physical track addresses by referring to a mapping table stored in a memory," as recited in independent claim 15. The applicants respectfully submit that Ueda fails to make up for the deficiencies in Melrose, the combination of Melrose and Ueda does not suggest the features of independent claims 1, 6, 11 and 15, and the cited motivation is not an adequate motivation to suggest the combination of Melrose and Ueda to one of ordinary skill to teach the features of the present invention. Accordingly, claims 1, 6, 11 and 15 patentably distinguish over the references relied upon.

Claims 2, 7, 12-14 and 17 depend either directly or indirectly on independent claims 1, 6, 11 and 15, and include all the features of their respective independent claims, plus additional features that are not discussed or suggested by the references relied upon. For example, claim 14 recites that "the setting the deviation of the references head as a zero value is by adding an identical constant to the physical track addresses accessed by the respective, individual heads." Therefore, as claims 2, 7, 12-14 and 17 are dependent on claims 1, 6, 11 and 15, claims 2, 7, 12-14 and 17 patentably distinguish over the references relied upon for at least the reasons noted above. Accordingly, withdrawal of the § 103(a) rejection is respectfully requested.

III. Allowable Subject Matter

Applicants appreciate the acknowledgement by the Examiner that claims 3 and 8, which are objected to, would be allowable if rewritten in independent form to include all of the features of the base claim. Accordingly, claims 3 and 8 have been rewritten in independent form as new claims 23-24.

Conclusion

In accordance with the foregoing, claims 23-24 have been added. Claims 1-24 are pending and under consideration.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

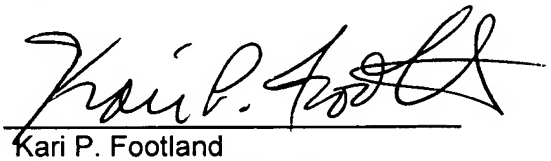
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 4/26/06

By: 

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